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IN THE UNITED STATES DISTRICT COURT
FOR THE DISTRICT OF MONTANA
MISSOULA DIVISION

SAMANTHA ALARIO, et al., *Plaintiffs*, and TIKTOK INC., *Consolidated Plaintiff*, v. AUSTIN KNUDSEN, *in his official capacity as Attorney General of the State of Montana*, *Defendant*.	CV 23-56-M-DWM CV 23-61-M-DWM **DECLARATION OF KAREN SPRENGER**

I, Karen Sprenger, under penalty of perjury, hereby declare as follows:

1. I am the Chief Operating Officer of LMG Security, a consulting firm based in Missoula, Montana that provides cybersecurity solutions, compliance and advisory services, and technical testing for clients across a range of industries. I have more than 30 years of experience in the cybersecurity and information technology fields. I am a GIAC Certified Forensic Examiner, a Certified Information Systems Security Professional, and a former member of the Montana Information Security Advisory Council and the Montana Cybercrimes Task Force. Prior to my tenure at LMG Security, I served for 13 years as the Director of Information Technology for Billings Public Schools, where I was responsible for managing the district's information network, including hardware, email systems, data systems, and network security. I have attached a true and correct copy of my curriculum vitae to this declaration.

2. I have been retained by the Consolidated Plaintiff in this case, TikTok Inc. ("TikTok"), to analyze the technological feasibility of implementing "An Act Banning TikTok in Montana" (the "TikTok Ban" or the "Ban"). I understand that the TikTok Ban prohibits the operation of TikTok in the State and imposes a $10,000 penalty for each "discrete violation," which is defined as any time "a user accesses tiktok, is offered the ability to access tiktok, or is offered the ability to

download tiktok" in the "territorial jurisdiction of Montana."[1] Penalties are imposed on TikTok and any "mobile application store" that violates the Ban; "users of tiktok" are not subject to monetary penalties.[2]

3. As discussed below, to implement the Ban, TikTok must be able to identify whether a user is physically present in Montana (i.e., "geolocate" the user in Montana) and, if so, block that user's access to the TikTok application. Blocking users based on their physical location is known as "geofencing." Apps that engage in geofencing most commonly identify a user's geographic location using GPS data, which can accurately estimate a user's location to within a few meters of where she is physically standing.[3] TikTok has explained, however, that the current version of the TikTok application does not collect GPS data from U.S. users.[4]

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[1] S.B. 419, 2023 Sen., 68th Sess. §§ 1(1), 1(2) & 1(7)(a) (Mont. 2023).

[2] *Id.* §§ 1(2), 1(5) & 1(7)(b).

[3] *GPS Accuracy*, Nat'l Coordination Off. for Space-Based Positioning, Navigation, and Timing, https://www.gps.gov/systems/gps/performance/accuracy/#:~:text=For%20example%2C%20GPS%2Denabled%20smartphones,receivers%20and%2For%20augmentation%20systems (last modified Mar. 3, 2022).

[4] Shou Chew, *Written Statement of Testimony*, U.S. House Comm. on Energy & Commerce, at 8 (Mar. 23, 2023), https://docs.house.gov/meetings/IF/IF00/20230323/115519/HHRG-118-IF00-Wstate-ChewS-20230323.pdf.

4. There are other techniques for geolocating users, but they are less accurate. For example, one category of information that TikTok collects from users that can be used to geolocate users is IP address information.[5] But IP addresses are a significantly less precise—and often inaccurate—means of attempting to identify a user's geographic location. Accordingly, any geofencing regime based on IP address information will be of limited efficacy, allowing some users in Montana to access the TikTok app while denying access to some non-Montana users, even though they are not physically present in Montana and the TikTok Ban does not apply to them.

5. The accuracy of IP-based geolocation can sometimes be increased by analyzing IP addresses together with other data signals, such as information regarding local Wi-Fi networks, but such a form of enhanced IP-based geolocation necessarily would require the collection of more information from TikTok users—and not just from users in Montana. To evaluate whether a particular user has entered Montana from another jurisdiction, it would be necessary to collect GPS or other geolocation data from all U.S. TikTok users, both inside and outside Montana.

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[5] *Privacy Policy*, TikTok (last updated May 23, 2023), https://www.tiktok.com/legal/privacy-policy?lang=en ("We collect certain information about the device you use to access the Platform, such as your IP address….").

6. I am aware of statements by Montana government officials and others who presume that it should be feasible to implement the TikTok Ban based on: (i) the ability of other mobile applications, including sports-betting apps, to geofence users; (ii) the enforcement of TikTok bans on government devices; and (iii) bans of certain websites and apps, including TikTok, in foreign countries.[6] These statements, however, do not appreciate the difficulties of implementing a *regional* TikTok ban that prohibits users from accessing the app on *personal* devices, in the absence of *accurate* geolocation data.

7. Below, I discuss the difficulties of using IP address information to attempt to geofence TikTok users in Montana. I then explain why various

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[6] *See, e.g.*, *An Act Banning TikTok in Montana: Hr'g on S.B. 419 Before the H. Judiciary Comm.*, 2023 Leg., 68th Sess. (Mont. 2023), http://sg001-harmony.sliq.net/00309/Harmony/en/PowerBrowser/PowerBrowserV2/20230516/30/44792 (Attorney General Knudsen: "They [TikTok] do have the ability to geo-fence certain apps out of Montana. That technology exists and it's in use. I'll point to certain gambling apps. . . . Why is it when you drive between states, suddenly your gambling app in one legal state shuts off and is not able to be used in the state you're visiting? It's because they geo-fence that app out. That technology exists."); Katie Paul, *How Montana Could Enforce a TikTok Ban*, Reuters (May 19, 2023), https://www.reuters.com/technology/how-montana-could-enforce-tiktok-ban-2023-05-18/ (noting that "[t]ech companies are now well-practiced in blocking apps at the country level"); Bobby Allyn, *Montana Banned TikTok. Whatever Comes Next Could Affect the App's Fate in the U.S.*, NPR (May 18, 2023), https://www.npr.org/2023/05/18/1176940592/montana-ban-tiktok-lawsuit-constitution (Roger Entner, telecommunications analyst: "If they can prevent you in China from accessing Google, that's the same thing.").

statements in support of the feasibility of the Ban—based upon analogies to sports-betting apps, government device bans, and country-wide bans—are not appropriate.

I. IP Addresses Are an Imprecise Tool for Geolocation.

8. An IP address is a string of numbers assigned to an Internet-connected device that serves to identify the device and allow data and information to be transmitted to it through the Internet. One can think of an IP address like a telephone number. In order to receive a phone call, one must provide the caller with her number so that the caller knows where to direct the call. Similarly, in order to receive data through the Internet, a device needs to have an identifying number or address so that the sender can identify the device and transmit data to it.

9. An IP address is not a random assortment of numbers. It is produced mathematically by the Internet Assigned Numbers Authority ("IANA"), a standards organization that oversees global IP address allocation.[7] The IANA allocates IP addresses to five Regional Internet Registries ("RIRs"), which, in turn,

[7] *Number Resources*, IANA, https://www.iana.org/numbers (last visited July 3, 2023).

assign IP addresses to local Internet registries, including Internet Service Providers ("ISPs").[8] ISPs, in turn, assign IP addresses to individual or corporate customers.[9]

10. IP addresses may be static or dynamic. A static IP address is one that never changes. Static IP addresses are most often assigned to businesses and institutions that maintain servers and other equipment that require permanent IP addresses for other devices to reference. Dynamic IP addresses, by contrast, are IP addresses that change regularly and automatically. Dynamic IP addresses are often assigned to individuals who access the Internet through home computers or other personal devices. When an individual accesses the Internet from her home network or personal device, her router—or main connection point—is assigned an IP address by her ISP. The customer uses the assigned IP address for a set interval (configured by the system administrator and referred to as a "DHCP lease"), after which her IP address is generally released and returns to the ISP's pool of unassigned addresses. IP addresses may also be returned to the unassigned pool if the customer reboots her router. At that point, the address may be assigned to another one of the ISP's customers who needs access to the Internet at that point in

[8] *Id.* ISPs include national ISPs (like Spectrum or Verizon), which generally service their customers with a national pool of IP addresses, or local ISPs (such as Montana Internet in Montana), which service their customers with a smaller pool of IP addresses.

[9] *Id.*

time. There are only a limited number of publicly-accessible static IP addresses available globally or on a given ISP's network. Therefore, personal devices often only retain the same dynamic IP address for a limited amount of time.

11. IP addresses serve to identify devices connected to the Internet, but they do not, in and of themselves, disclose a device's exact geographic location.[10] However, it may be possible to estimate the location of a device using its IP address in combination with a variety of other information, including "Whois" lookups,[11] network latency information, network topology information, and information made available by ISPs.[12] Indeed, there are a number of private companies that utilize such techniques to create and maintain databases that seek to tie IP addresses to devices' locations.[13]

12. IP geolocation is the practice of attempting to determine a device's physical location based on the assigned IP address. While IP geolocation may

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[10] Dan Komosny, Miroslav Voznak & Saeer Ur Rehman, *Location Accuracy of Commercial IP Address Geolocation Databases*, 46 J. of Info. Tech. 333, 334 (2017).

[11] "Whois" databases are publicly accessible databases maintained by RIRs that store internet resource registration data, including the registered users or assignees of IP addresses. *See Using Whois*, ARIN, https://www.arin.net/resources/registry/whois/ (last visited July 3, 2023).

[12] Ovidiu Dan, Vaibhav Parikh & Brian D. Davison, *IP Geolocation through Reverse DNS*, 22 ACM Transactions on Internet Tech. 17, 17(2) (2021).

[13] *Id.*

provide some information regarding where a particular device may be located, it provides only a rough estimate of the device's location that can be erroneous for a variety of reasons. For example, MaxMind, an IP intelligence firm that maintains a commercial IP geolocation database, has stated that its IP geolocation products are capable of correctly estimating a U.S. device's location, plus or minus 50 kilometers, between 81% and 83% of the time.[14] IP2Location, another company that maintains an IP geolocation database, has stated that its geolocation product correctly estimates a U.S. device's location, plus or minus 50 miles, 76.32% of the time.[15] It is important to note that these statistics are national averages. Accuracy rates are lower for less densely populated areas of the country (like much of Montana) because of the more limited Internet traffic in those areas.[16] The result of these limitations is that a user in Sidney, Montana, for example, may be identified as being in North Dakota, or a user in West Yellowstone, Montana may be identified as being in Wyoming. Similarly, a user in Kellogg, Idaho may be identified as being in Montana.

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[14] *GeoIP2 City Accuracy*, MaxMind, https://www.maxmind.com/en/geoip2-city-accuracy-comparison?country=US&resolution=50&cellular=excluding (last visited July 3, 2023).

[15] *IP Geolocation Data Accuracy*, IP2Location, https://www.ip2location.com/data-accuracy (last visited July 3, 2023).

[16] Komosny *et al.*, *supra* n.10, at 340.

13. There are a number of reasons why IP geolocation technology can estimate a device's location with only limited accuracy. First, there is no definitive source that ties an IP address to a device's physical location, meaning that geolocation companies are limited in their ability to test and refine their location methodologies. Second, the information that comes out of an IP geolocation database is only as good as the information that goes in. If an ISP does not provide a geolocation company with accurate information—or if the ISP or geolocation company does not update its information quickly enough—the data generated by the geolocation company may be inaccurate. Lastly, IP addresses were never designed to provide geolocation functionality.

14. Estimating a *mobile* device's geolocation based on IP address information is particularly difficult, leading to lower accuracy rates. MaxMind, for example, estimates that it can correctly estimate a U.S. mobile device's geographic location, plus or minus 50 kilometers, between 37% and 38% of the time.[17] A recent scientific study pegged the accuracy of such estimates even lower, concluding that IP geolocation companies are capable of correctly estimating the

[17] *GeoIP2 City Accuracy*, MaxMind, https://www.maxmind.com/en/geoip2-city-accuracy-comparison?country=US&resolution=50&cellular=exclusively (last visited July 3, 2023).

location of mobile devices, plus or minus 50 kilometers, only between 15% and 28% of the time.[18]

15. One reason why there are additional difficulties with respect to mobile devices is because, unlike local ISPs, many national Internet providers, like cell phone companies, service their customers nationally with a pool of IP addresses that are not tied to any specific geographic region. Accordingly, identifying a particular IP address as associated with a national Internet provider does not provide the same kind of geolocation information as tying an IP address to local ISP. Moreover, mobile devices, like cell phones, obtain new IP addresses as they move locations, connecting and disconnecting from cellular data, satellite, and Wi-Fi networks. This means that the IP address associated with a mobile device is constantly changing, making it even harder than with desktop computers to estimate the device's location based on IP address information.

16. In addition to the inherent limitations of IP geolocation technology, users can—and do—mask their IP addresses, for enhanced security and privacy. For example, virtual private networks, or "VPNs," hide information about a user's IP address by routing a device's Internet connection through a private service rather than the user's ISP. By using a VPN, a user can access the Internet through a private, encrypted tunnel that makes the activity appear to come from the VPN's

[18] Komosny *et al.*, *supra* n.10, at 336.

IP address (and location) and hides the user's personal information, location, and other electronic data, making it impossible to estimate the user's location based on her IP address alone. Internet users are increasingly employing VPNs to protect their online privacy; for example, *Forbes* reported that, as of 2023, 69% of people use a VPN on a mobile device.[19]

17. In my opinion, for the reasons described above, it would not be technologically feasible for TikTok to reliably determine whether a user is in Montana based on IP address information. The accuracy of IP-based geolocation data is limited, particularly for users accessing the Internet through mobile devices. Even then, geolocation data provides only a rough approximation of a device's location, which poses particular problems for implementing the TikTok Ban near Montana's borders. All of these factors necessarily would impede TikTok's ability to implement the TikTok Ban based on IP address information.

II. Statements Made in Support of the Ban's Feasibility Misunderstand the Relevant Technology.

18. A number of Montana officials and commentators have asserted that it is technologically feasible to implement and enforce the TikTok Ban.[20] These individuals have pointed to: (i) the ability of other mobile applications, particularly

[19] Chauncey Crail, *VPN Statics and Trends in 2023*, Forbes (Feb. 9, 2023), https://www.forbes.com/advisor/business/vpn-statistics/.

[20] *See supra* ¶ 6.

sports-betting apps, to geofence users; (ii) the enforcement of laws, regulations, and executive decrees banning TikTok on government devices; and (iii) country-wide bans of websites and apps in foreign countries. As explained below, these statements in support of the technological feasibility of the TikTok Ban misunderstand the relevant technology.

A. Sports-Betting Apps

19. In recent years, a number of companies have launched mobile sports-betting apps, which allow users to place bets on sporting events online and on their mobile devices. Because sports betting is illegal in certain States, sports-betting apps take steps to identify users' geographic locations before allowing them to place bets.[21] Absent such geofencing, sports-betting apps might run afoul of certain State laws.

20. Sports-betting apps generally verify users' geographic locations using one of two methods. First, sports-betting apps are designed to collect users' GPS data. If a user seeks to place a bet on a mobile device, such as a cell phone, the user is generally required to grant the app access to her device's GPS data.[22] As

[21] Katherine Sayre, *A Gamble on Betting Pays Off*, Wall St. J. (Apr. 22, 2023).

[22] *See, e.g.*, *Using DraftKings with GeoComply Location Services – Overview (US)*, DraftKings, https://help.draftkings.com/hc/en-us/articles/4405236822931-Using-DraftKings-with-GeoComply-location-services-overview-US- (last visited July 3, 2023); *Why Can't I Play? Do I Need a GeoComply Plugin?*, TropicanaCasino.com (last updated Oct. 9, 2018),

explained above, GPS data provides a more precise and accurate way to verify a user's geographic location, with GPS-enabled cell phones capable of accurately identifying a user's location to within a five-meter radius.[23] GPS data thus allows sports-betting apps to estimate a user's location with both precision and accuracy.

21. Second, if the user seeks to place a bet on a device that does not have or cannot use location-based services (which collect GPS data), or does not have location-based services enabled, the sports-betting app typically requires the user to download a "plugin" that verifies the user's location.[24] The most commonly used plugin in the sports-betting industry is offered by a company called GeoComply, which verifies a user's location based on a variety of data, including Wi-Fi signals, to which the user grants GeoComply access.[25] As of April 2023,

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https://support.tropicanacasino.com/hc/en-us/articles/229967408-Why-can-t-I-play-Do-I-need-a-GeoComply-plugin-.

[23] *See supra* ¶ 3.

[24] *See, e.g.*, *Using DraftKings with GeoComply Location Services – Overview (US)*, DraftKings, https://help.draftkings.com/hc/en-us/articles/4405236822931-Using-DraftKings-with-GeoComply-location-services-overview-US- (last visited July 3, 2023); *Why Can't I Play? Do I Need a GeoComply Plugin?*, Tropicana Casino (last updated Oct. 9, 2018), https://support.tropicanacasino.com/hc/en-us-articles/229967408-Why-can-t-I-play-Do-I-need-a-GeoComply-plugin-.

[25] Sayre, *supra* n.21.

more than 90% of the U.S. sports-betting industry used GeoComply technology to assist in verifying users' locations.[26]

22. The ability of sports-betting apps to geofence users does not support the feasibility of implementing the TikTok Ban. As explained above, the current version of the TikTok app does not collect GPS data from U.S. users, and thus this method of verifying users' locations is unavailable to TikTok, unless TikTok were to start collecting additional data from all U.S. users—both inside and outside of Montana.[27] Similarly, utilizing a GeoComply plugin or other similar service would, once again, require U.S. TikTok users to provide additional data. Thus, the analogy to sports-betting apps rests on a premise that TikTok would collect more information from users, akin to the data currently collected by sports-betting apps.

B. Prohibitions on the Use of TikTok on Government Devices Are Not Relevant to TikTok's Ability to Implement the TikTok Ban.

23. Since 2020, the federal government and a number of States have banned the use of TikTok on government-issued devices.[28] To implement these bans, government agencies—which have control of, and remote access to, the

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[26] *Id.*

[27] *See supra* ¶ 3.

[28] Sapna Maheshwari & Amanda Holpuch, *Why Countries Are Trying to Ban TikTok*, N.Y. Times (May 23, 2023), https://www.nytimes.com/article/tiktok-ban.html#:~:text=The%20White%20House%20told%20federal,TikTok%20from%20all%20devices%20nationwide.

users' devices—have deleted the TikTok app from agency devices and installed software preventing users from accessing the TikTok app going forward.[29] In my experience, these strategies are an effective method for an employer, like a federal or a state agency, to implement a device ban. Indeed, I have advised a number of clients who utilize similar strategies to block employees' access to certain websites and applications on employer-owned devices.

24. These strategies, however, are not available to TikTok to comply with the TikTok Ban. Unlike government agencies, TikTok does not exercise physical or legal control over the devices subject to the Ban in Montana, as the devices subject to the Ban belong to TikTok users. Because TikTok does not exercise physical or legal control over TikTok users' devices, the strategies used to implement government-device bans cannot be used to implement the TikTok Ban.

25. Indeed, even if they were feasible, such actions would not suffice to implement the Ban. As drafted, the Ban prohibits any individual who is physically present in Montana from accessing TikTok,[30] meaning that the Ban must be implemented in a way that prevents residents, visitors, and those simply passing

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[29] Memorandum for the Heads of Executive Departments and Agencies on "No TikTok on Government Devices" Implementation Guidance, Office of Management & Budget (Feb. 27, 2023), https://www.whitehouse.gov/wp-content/uploads/2023/02/M-23-13-No-TikTok-on-Government-Devices-Implementation-Guidance_final.pdf.

[30] S.B. 419, 2023 Sen., 68th Sess. § 1(1) (Mont. 2023).

through Montana from accessing the app. Even if TikTok had legal or physical control over users' devices—which it does not—there is no practical way for TikTok to install software on a user's device when she enters Montana and then uninstall such software once she leaves the State. Government device bans—which prohibit the use of TikTok on specified *devices*, not within specified *areas*—do not need to account for the mobility of users' devices. Accordingly, the implementation strategies discussed above are effective in implementing a government devices ban, but not Montana's TikTok Ban.

C. Country-Wide Bans Are Not Indicative of TikTok's Ability to Implement Montana's TikTok Ban.

26. I am aware of two countries that have permanently banned the use of TikTok within their borders: India, in 2020, and Afghanistan, in 2022.[31] While some commentators have pointed to country-wide bans to argue that implementing the TikTok Ban is feasible,[32] there are important distinctions between

[31] *India Bans TikTok, WeChat and Dozens More Chinese Apps*, BBC (June 29, 2020), https://www.bbc.com/news/technology-53225720; Ali M. Latifi, *The Taliban Can't Stop TikTok*, Wired (Feb. 6, 2023), https://www.wired.com/story/the-taliban-cant-stop-tiktok/.

[32] *See* Paul, *supra* n.6; Allyn, *supra* n.6.

implementing a ban at the national level and a ban at the level of a political sub-division, such as a U.S. State.

27. With respect to availability in app stores, for example, the Apple App Store and Google Play Store both make apps available on a nationwide basis in the United States. There is no ability for a developer to select that they want their app to be made available in only certain specific U.S. States.[33]

28. As another example, the standards organizations that allocate IP addresses, like IANA and the RIRs discussed above, keep records of the *country* to which an IP address is allocated, but not necessarily the *state* or *region*. Accordingly, more reliable information exists about the country associated with an IP address, but not the state, county, or city. IP geolocation companies maintain that they can correctly identify the country associated with an IP address with more than 95% accuracy, while the accuracy rates for identifying the city or region are appreciably lower.[34]

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[33] *Set Availability for Your App*, Apple, https://developer.apple.com/help/app-store-connect/manage-your-apps-availability/set-availability-for-your-app/ (last visited July 3, 2023); *Distribute App Releases to Specific Countries*, Google, https://support.google.com/googleplay/android-developer/answer/7550024?hl=en (last visited July 3, 2023).

[34] *See supra* ¶¶ 12–15; *see also Everything You Need to Know About IP Based Geolocation*, If-So, https://www.if-so.com/geo-targeting/ (last visited July 3, 2023). Even at the country level, however, IP addresses for particular countries are not easily segmented and identified; for example, Afghanistan has 222,976 IP addresses that fall into non-contiguous ranges. *See* Afghanistan IP Address

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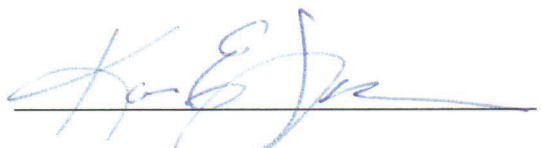
29. In sum, the most commonly used technology for accurate geolocation is GPS data, which the current version of the TikTok app does not collect from U.S. users. There are other technologies that are used in the marketplace to geolocate users for sports-betting apps and in other settings, but they also require collecting specific data from users (such as Wi-Fi signals) to support the geolocation. Without collecting this additional data—which may or may not be technologically feasible for TikTok—a platform like TikTok would be forced to rely on IP address data to attempt to geolocate users, which is imprecise and often inaccurate for the reasons discussed above.

Pursuant to 28 U.S.C. § 1746, I declare under penalty of perjury that the foregoing is true and correct to the best of my knowledge.

Executed this 5th day of July, 2023.



Karen Sprenger

Ranges, IP2Location, https://lite.ip2location.com/afghanistan-ip-address-ranges?lang=en_US (last visited July 3, 2023).